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Original article

Isolation, identification and anti-candidal activity of filamentous fungi from Saudi Arabia soil

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ABSTRACT

Ten fungal strains; namely, *Penicillium melinii*, *Petriella setifera*, *Aspergillus pseudo-niger*, *Alternaria chlamydospora*, *Pythium nayoroense*, *Phoma glomerata*, *Mucor ramosissimus*, *Mucor racemosus*, *Fusarium chlamydosporum* and *Rhizopus azygosporus* were isolated from soil. The extra- and intra-cellular extracts of the fungal strains grown on malt extract and yeast-extract sucrose media were screened for their anticandidal activity against different clinically-isolated *Candida* species. Most of the fungal extracts showed activity against different *Candida* species. However, the fungal strains grew on malt extract showed greater activities than those grew on yeast extract sucrose media. The activity of the intracellular was higher than the extracellular metabolites. All fungal extracts (extra and intra) were similar in chemical constituent; they contained carbohydrates and/or glycosides, unsaturated sterols and/or triterpens, tannins and traces of coumarins. Alkaloids, flavonoids, saponins, anthraquinones and cardenolides were no detected. The intra-cellular extracts contained more compounds than the extra-cellular extracts.

1. Introduction

Soils are very complex, having numerous constituents performing different functions mainly due to the activity of soil organisms (Ullah et al., 2017; Raja et al., 2017; Kostadinova et al., 2009). The microorganisms plays significant role in soil ecosystem. The soil quality is determining by microbial composition and functioning changes during decomposition of organic matter, recycling of nutrients and biological control (Stefanis et al., 2013). Fungi are very vital for the soil ecosystem since they play a key role in different essential processes including elemental release by mineralization and organic matter decomposition (Christensen, 1989). Moreover, the fungi are responsible for the decomposition of organic compounds and their activity contributes in the bio-deterioration and biodegradation of toxic substances in the soil (Rangaswami and Bagyaraj, 1998).

Fungi; eukaryotic microorganisms, can occur as unicellular (yeasts), filamentous (molds) form. Fungi are capable of causing superficial, cutaneous, subcutaneous, systemic or allergic diseases. Yeasts are microscopic fungi consisting of single cells that reproduce by budding while molds, in contrast, occur as long filaments known as hyphae, which grow by apical extension (Aggarwal, 2010; Baron, 1996). Generally, soil is an oligotrophic habitat for fungi because the fungal growths are limited and readily present for short periods in a restricted zone. Accordingly, fungi are either dormant, or metabolize and grow very slowly utilizing a range of organic molecules (Ratna Kumar et al., 2015). Fungi are playing a significant role in the daily life of human beings in addition to their participation in industry, agriculture, medicine, food industry, bioremediation, natural cycling, bio-fertilizers and other ways leading to human welfare (Karthikeyan et al., 2014; Dick, 2009; Kirk, 2004).

Fungi produce many antibiotics, having antibacterial and antifungal activity, which are widely used as drugs over the world especially the penicillin, cephalosporin and fusidic acid (Dobashi et al., 1998). The recent decades are characterized by the novel discoveries of microorganisms capable of producing compounds,

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as a potential source of new antibiotics (Ullah et al., 2017). Knowing this information in mind, the present study aimed at determining the diversity of fungi in the soil of Al-Qassim governorate, Saudia Arabia and making an assessment of their anticandidal activity.

2. Material and methods

2.1. Fungal isolation and identification

2.1.1. Fungal isolation

2.1.1.1. Samples collection. Soil samples from different places in Al-Qassim region, KSA, were collected after 10–15 cm deep pits dug. The samples were collected in sterile zipper polythene bags and stored at 4 °C until used.

2.1.1.2. Isolation of fungi. Different media including potato dextrose, czapek's dox, malt extract, and yeast extract sucrose and yeast malt extract agar media were used. Sprinkle plates were used as isolation techniques. Sprinkle plates were prepared by uniformly distributing the soil directly on the surface of the medium. The plates were incubated for 5–7 days at 25 °C. Fungi growing on the agar plates were purified by single spore and hyphal-tip technique and transferred to malt extract slants and then maintained as a stock culture.

2.1.2. Fungal identification

The isolated fungi were identified to the genus and the species level on the basis of their morphological characters and microscopic analysis by using suitable media, slide cultures (obtained by inoculating microfungi directly on a small square of agar

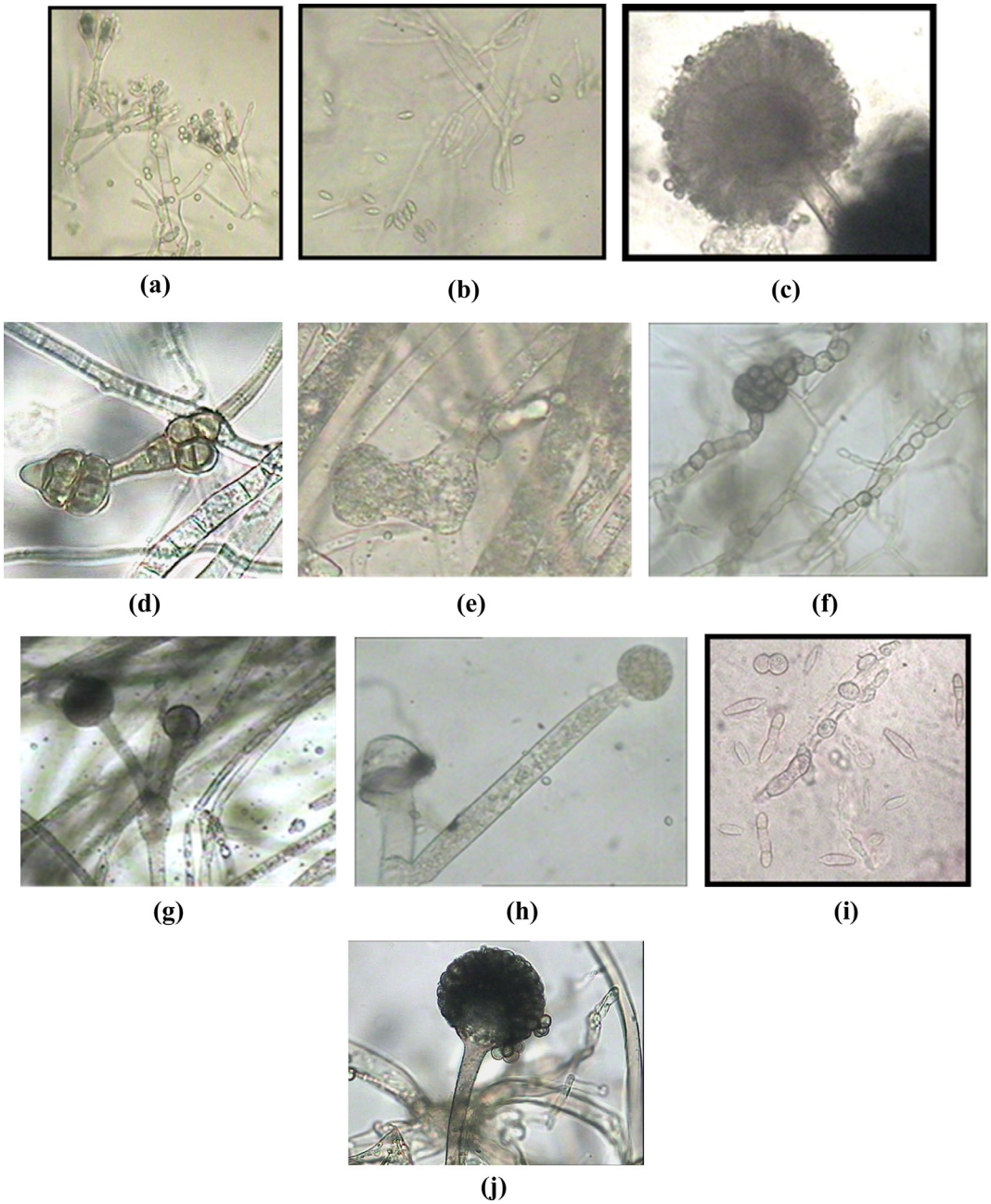

Fig. 1. The vegetative and reproductive structures of fungal isolates; *Penicillium melinii* (a), *Petriella setifera* (b), *Aspergillus pseudo-niger* (c), *Alternaria chlamydospora* (d), *Pythium nayoroense* (e), *Phoma glomerata* (f), *Mucor ramosissimus* (g), *Mucor racemosus* (h), *Fusarium chlamydosporum* (i) and *Rhizopus azygosporus* (j).

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